(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 638 659 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
17.04.1996 Bulletin 1996/16

(43) Date of publication A2:
15.02.1995 Bulletin 1995/07

(21) Application number: **94112207.9**

(22) Date of filing: **04.08.1994**

(51) Int. Cl.[6]: **C23C 14/34**, C23C 14/00, C23C 14/14

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **05.08.1993 US 102585**

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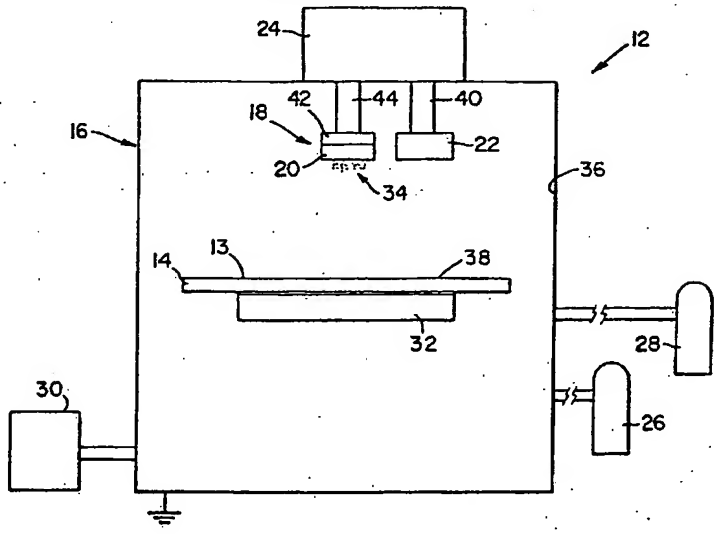
(54) Sputter-coating target and method of use

(57) A sputter coating target which alleviates the need for anode reconditioning due to a buildup of a non-conductive coating comprises a coating component which itself or its reactive product is substantially electrically nonconductive and a dopant component which itself or its reactive product is substantially electrically conductive.

Fig.1



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EUROPEAN SEARCH REPORT

Application Number EP 94112207.9

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 6)
A	US - A - 5 188 887 (PHILIP J. LINGE et al.) * Abstract; claims 1-8; example 1 * --	1-21	C 23 C 14/34 C 23 C 14/00 C 23 C 14/14
A	US - A - 5 171 411 (JAMES W. HILLENDAHL et al.) * Abstract; claims 1-14 * --	1-21	
A	US - A - 5 108 846 (HELMUT STEININGER) * Abstract; claims 1-7 * --	1-21	
A	US - A - 4 966 676 (YOSHIHARU FUKASAWA et al.) * Abstract; claims 1-14 * --	1-21	
A	US - A - 4 954 232 (TAKASHI YAMADA et al.) * Abstract; claims 1-12 * ----	1-21	

TECHNICAL FIELDS SEARCHED (Int. Cl. 6)

C 23 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	01-02-1996	HAUK

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)

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SUPPLEMENTARY EUROPEAN SEARCH REPORT

Application Number
EP 96 90 4456

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 481 416 A (CIT ALCATEL) 22 April 1992 * column 4, line 4 - column 5, line 17; figure 2 *	1,13	C23C14/35
A	WO 91 20091 A (GEN VACUUM EQUIP LTD) 26 December 1991 * page 11, paragraph 2 - page 12, paragraph 1; figure 6A * * abstract *	1,13	
X	DE 27 07 144 A (SLOAN TECHNOLOGY CORP) 25 August 1977 * figures 1,2,19 * * page 14, paragraph 1 * * page 21, paragraph 2 *	7-12	
A	EP 0 451 642 A (APPLIED MATERIALS INC) 16 October 1991 * page 9, line 23 - line 25; figure 15B *	19,20	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

H01J

The supplementary search report has been drawn up for the claims attached hereto.

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 March 1998	Noordman, F

CATEGORY OF CITED DOCUMENTS

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T : theory or principle underlying the invention
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L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C04)

WHAT IS CLAIMED IS:

1. A cylindrical magnetron comprising:

a rotatable cylindrical target;

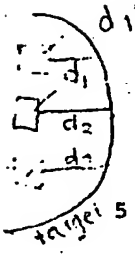
an elongated center magnetic section of a first polarity positioned within the rotatable cylindrical target, the elongated center magnetic section being essentially linearly arranged in a single row; and

an outer magnet section of a second polarity positioned within the rotatable cylindrical target and arranged around the center magnet section such that spaces are defined between the outer magnet section and the elongated center magnetic section, wherein the elongated center magnetic section and the outer magnet section define a magnetic field to enclose a racetrack shaped plasma around a center area, the racetrack defining an inner edge around a non-plasma center area and an outer edge, the inner and outer edge being at the cylindrical target, the racetrack having roughly parallel leg portions and roughly parabola shaped end portions.

2. The cylindrical magnetron of claim 1, wherein the outer magnet section comprises side pieces arranged adjacent to the elongated sides of the center magnet section and end pieces arranged adjacent to the ends of the center magnet section.

3. The cylindrical magnetron of claim 2, wherein the side pieces are closer to the center magnetic section than the end pieces are to the center magnetic section.

4. The cylindrical magnetron of claim 1, wherein the outer magnet section comprises side pieces arranged adjacent to the elongated sides of the center magnet section and wherein the elongated center magnetic section and the side pieces are rectangular in cross-section with the outer faces of the elongated center magnetic section and of the side pieces being approximately tangential to the planes defined through the center of rotatable magnetron and a center line of the outer faces.



5. The cylindrical magnetron of claim 1, wherein the clearance between the outer faces of the center magnetic element and the cylindrical target is approximately the same as the clearance between the outer faces of the side pieces and the cylindrical target.

6. The cylindrical magnetron of claim 1, wherein the magnetic field at the cylindrical magnetron near the ends of the outer magnet section is approximately the same as the magnetic field at the cylindrical magnetron near the center of the outer magnet section in order to help maintain the magnetic bottle effect.

7. A cylindrical magnetron comprising:

a rotatable cylindrical target;

an elongated center magnetic section of a first polarity positioned within the rotatable cylindrical target, the elongated center magnetic section being essentially linearly arranged in a single row; and

an outer magnet section of a second polarity positioned within the rotatable cylindrical target and arranged around the center magnet section such that

spaces are defined between the outer magnet section and the elongated center magnetic section, wherein the elongated center magnetic section and the outer magnet section define a magnetic field to enclose a racetrack shaped plasma around a center area, the racetrack defining an inner edge around a non-plasma center area and an outer edge, the inner and outer edge being at the cylindrical target, the racetrack having roughly parallel leg portions and roughly triangularly shaped end portions.

8. The cylindrical magnetron of claim 7, wherein the outer magnet section comprises side pieces arranged adjacent to the elongated sides of the center magnet section and end pieces arranged adjacent to the ends of the center magnet section.

9. The cylindrical magnetron of claim 8, wherein the side pieces are closer to the center magnetic section than the end pieces are to the center magnetic section.

10. The cylindrical magnetron of claim 7, wherein the outer magnet section comprises side pieces arranged adjacent to the elongated sides of the center magnet section and wherein the elongated center magnetic section and the side pieces are rectangular in cross-section with the outer faces of the elongated center magnetic section and of the side pieces being approximately tangential to the planes defined through the center of rotatable magnetron and a center line of the outer faces.

11. The cylindrical magnetron of claim 7, wherein the clearance between the outer faces of the center magnetic element and the cylindrical target is approximately the same as the clearance between the outer faces of the side pieces and the cylindrical target.

12. The cylindrical magnetron of claim 7, wherein the magnetic field at the cylindrical magnetron near the ends of the outer magnet section is approximately the same as the magnetic field at the cylindrical magnetron near the center of the outer magnet section in order to help maintain the magnetic bottle effect.

13. A cylindrical magnetron comprising:

a rotatable cylindrical target;

an elongated center magnetic section of a first polarity positioned within the rotatable cylindrical target, the elongated center magnetic section being essentially linearly arranged in a single row; and

an outer magnet section of a second polarity positioned within the rotatable cylindrical target and arranged around the center magnet section such that spaces are defined between the outer magnet section and the elongated center magnetic section, wherein the elongated center magnetic section and the outer magnet section define a magnetic field to enclose a racetrack shaped plasma around a center area, the racetrack defining an inner edge around a non-plasma center area and an outer edge, the inner and outer edge being at the cylindrical target, the racetrack having roughly parallel leg portions and roughly semi-ellipse shaped end portions.

cl.13 | cl.13 + cl.2 = 14. The cylindrical magnetron of claim 13, wherein the outer magnet section comprises side pieces arranged adjacent to the elongated sides of the center magnet section and end pieces arranged adjacent to the ends of the center magnet section.

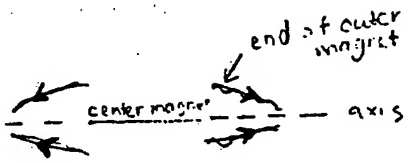
cl.13 + cl.3 = 15. The cylindrical magnetron of claim 14, wherein the side pieces are closer to the center magnetic section than the end pieces are to the center magnetic section.

cl.13 | cl.13 + cl.4 = 16. The cylindrical magnetron of claim 13, wherein the outer magnet section comprises side pieces arranged adjacent to the elongated sides of the center magnet section and wherein the elongated center magnetic section and the side pieces are rectangular in cross-section with the outer faces of the elongated center magnetic section and of the side pieces being approximately tangential to the planes defined through the center of rotatable magnetron and a center line of the outer faces.

cl.13 | cl.13 + cl.5 = 17. The cylindrical magnetron of claim 13, wherein the clearance between the outer faces of the center magnetic element and the cylindrical target is approximately the same as the clearance between the outer faces of the side pieces and the cylindrical target.

cl.13 | cl.13 + cl.6 = 18. The cylindrical magnetron of claim 13, wherein the magnetic field at the cylindrical magnetron near the ends of the outer magnet section is approximately the same as the magnetic field at the cylindrical magnetron

near the center of the outer magnet section in order to help maintain the magnetic bottle effect.

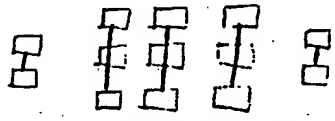


19. A cylindrical magnetron comprising:

a rotatable cylindrical target;

an elongated center magnetic section of a first polarity positioned within the rotatable cylindrical target, the elongated center magnet section being essentially linearly arranged in a single row; and defining an axis; and

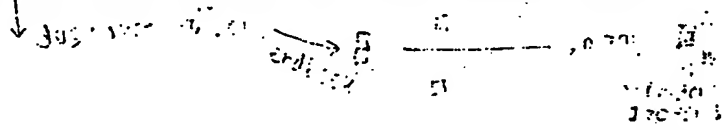
an outer magnet section of a second polarity positioned within the rotatable cylindrical target and arranged around the center magnet section, wherein an end portion of the outer magnetic section beyond the center magnetic section slopes gradually toward the axis.



cl 19

20. The cylindrical magnetron of claim 19, wherein the elongated center magnet section and the outer magnet section are comprised of rectangular block elements, wherein the ends of the outer magnetic section includes at least two rectangular block elements on opposite sides that are spaced closer to one another without contacting than the rectangular block elements on opposite sides at the center of the outer magnetic section.

cl. 19 oordt nl. ide over stand tussen blokken centrale gedeelte gezegd!



20 + cl. 6 = 21. The cylindrical magnetron of claim 20, wherein the magnetic field at the cylindrical magnetron near the ends of the outer magnet section is approximately the same as the magnetic field at the cylindrical magnetron

near the center of the outer magnet section in order to help maintain the magnetic bottle effect.

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